

LAUPĀHOEHOE NUI: ARCHAEOLOGY OF A HIGH-RISK LANDSCAPE ON WINDWARD HAWAI'I ISLAND

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Laupāhoehoe nui is an *ahupua'a* (traditional Hawaiian land division) encompassing approximately 2,500 acres in the Hāmākua district of Hawai'i Island, with a spectacularly remote and scenic 150-acre coastal terrace that is separated from the extensive upland region by a 1,200 foot-high cliff (Figure 1). To reach the coastal terrace today, one faces the options of an expensive helicopter ride, or kayaking over large swells along the cliff-ridden coastline from Waipi'o Valley, or taking a long and strenuous hike over cliffs and gullies to reach Waimanu Valley, and then picking your way over large loose boulders along the shoreline, crossing landslides at the base of the precipitous cliffs. The hike must be planned so that one traverses the boulder-strewn beaches at low tide, while some surging surf still reaches waist-level. Even then, one needs to cross under the crushing pressure of Kaimu Falls before arriving on the terrace. Most who take this option pull their shirts over their faces as they pass under the falls to help preserve air-pockets around their noses and mouths, fumbling along blindly with one hand reaching out to the cliff face. On my first trip out, I opted to take a kayak from the beach at Waipi'o. It took a reasonably pleasant hour, heading northwest with the wind, swells and currents, to time a landing on the rocky beach between swells. The trip back, however, was another matter, taking over four hours of strenuous paddling, fighting the combined forces of headwind, ocean swells, and opposing currents. It is not surprising, then, to find that in all the early records of Western travelers walking or sailing around Hawai'i Island, few actually visited Laupāhoehoe nui (Cordy 1994:41). To bring archaeological gear and samples back and forth, helicopters carrying slingloads have now become a necessary component of my field trips.

Despite our modern perceptions of Laupāhoehoe nui's inaccessibility, it should be considered that ancient Hawaiians

were not as intimidated by factors of access. When one arrives on the coastal terrace, there is ample evidence of past human activity there, including hundreds of irrigation terraces, dryland terraces, house platforms and trails. Nevertheless, other daunting risks remain that would be hard to overlook in any culture or time period. On August 19, 1823 during his trip around Hawai'i Island, the Reverend William Ellis described one such hazard:

After leaving Waimanu, we passed by Laupāhoehoe, a second village of that name on this part of the coast, where, according to the accounts of the natives, about eight or nine months before, an immense mass of rocks had suddenly fallen down. The mountain that remained appeared nearly 600 feet high. The face next the sea was perpendicular, and as smooth as a compact piece of masonry. The rock appeared volcanic, and the different strata of highly vesicular lava were very distinct. In several places we saw the water oozing from the face of the rock 200 or 300 feet from the summit.

The mass that had fallen lay in ruins at the base, where it had formed two considerable hills, filled up a large fish-pond and part of the sea, presenting altogether a scene of wide-spread desolation.

The original surface of the ground appeared to have been broken by an earthquake, as some parts were rent by deep chasms, others sunk down six or twelve feet lower than the rest. The shrubs and grass were growing luxuriantly on the upper or original, and lower or fallen surface, while the perpendicular space between them indicated that the latter had recently sunk down from the former.

Wrecks of houses were seen in several places, some partly buried by the ruins, other[s] standing just on the edge of the huge rocks that had fallen from above. Several houses were standing in the neighborhood, but all seemed deserted.

The natives say that in the evening when the accident took place, a mist or fog was seen to envelop the summits of the precipice, and that after the sun had set, a luminous appearance, like a lambent flame, was observed issuing from and playing about the top, which made them think it was a forerunner of Pele, or volcanic fire. A priest of Pele and his family, residing in one of the villages below, immediately offered his prayer to the goddess, and told the inhabitants that no harm would befall them.

About ten o'clock at night, however, the whole side of the mountain, for nearly half a mile in extent along the shore, fell down with a horrid crash.

Part of two small villages were destroyed, and sev-

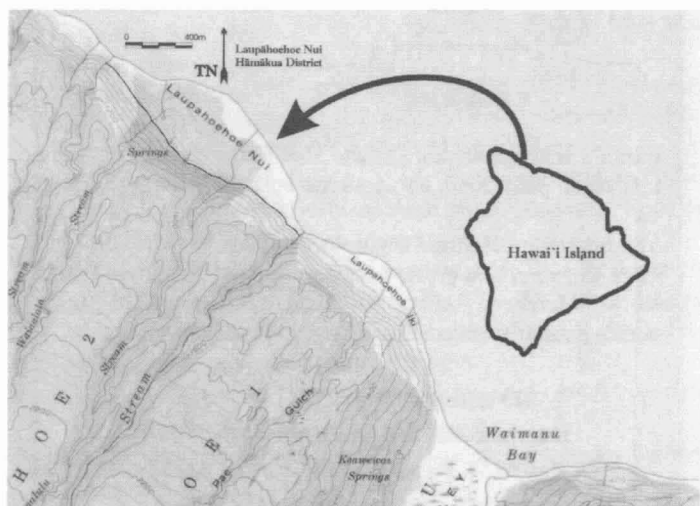


Figure 1. USGS Map of Laupāhoehoe nui.

eral of the inhabitants killed, but the natives did not agree as to the numbers; some said twenty were killed, others only eighteen.

The people with whom we talked on the spot, and at other places subsequently, could not recollect having heard the natives who escaped say anything about an earthquake at the time...

We did not land at this place, but passed close to the shore, and continued to sail along at the base of steep mountains, 500 or 600 feet high; and although nearly perpendicular, they were intersected here and there by winding paths, which we at first thought could be traveled only by goats, but up which we afterwards saw one or two groups of travelers pursuing their steep and rugged way (Ellis 1979:271-272).

The massive landslide in late 1822 or early 1823 was probably not an uncommon event at Laupāhoehoe nui. In fact, the entire coastal terrace is the result of recurrent landslides, and therefore, by its composition, one could assume that no portion of the terrace would be safe from future landslides. One still hears an occasional rock break loose in the middle of the night, and can find evidence of trees scarred by rock-fall.

Furthermore, because most of the coastal terrace is below 50 feet in elevation, it is well within a tsunami inundation zone, and the lowest portions of the terrace are also susceptible to more frequent storm surges. In 1994, Ross Cordy conducted an historical review of land claims made in Laupāhoehoe nui in the 1840s, and identified one enclosed lot that contained six houses (LCA 7132, NT 1848, 4:231). From a reasonably detailed map associated with the land claim (See Figure 2), one can discern that the same area today is no longer enclosed by any wall, and is instead strewn with large rounded boulders that have been thrown up from the ocean by storm surges or from major tsunamis, such as those that occurred along the Hāmākua coast in 1946 and 1960.

Although difficult access, rockslides, tsunamis, and storm surges are not limited to Laupāhoehoe nui, it is important to ask why people would have taken the risks inherent in living there, as opposed to the more accessible, wider, more fertile, and more protected nearby valleys of Waipi'o and Waimanu. A great deal of archaeological research in recent years in various portions of the globe has centered on assessing risk factors that early agricultural societies faced, and evaluating how they relate to the evolution of more complex societies (Goland 1993; Halstead and O'Shea 1989; Kirch 1984, 1994; Rautman 1993; Tainter and Tainter 1996). Thus, by establishing a better understanding of the timing and extent of human settlement at Laupāhoehoe nui and similar environments, we can learn something quite different than we could learn by studying the nearby major agricultural production centers. By assessing the risk factors inherent in the physical landscape, and how they affected patterns of settlement and use, we could identify a remarkably different cultural history for Laupāhoehoe nui as compared with the larger nearby valleys, and also learn something about the social processes that lead certain people to accept the greater environmental risks of living at Laupāhoehoe nui.

The cultural history of Laupāhoehoe nui has received little attention in published sources, although surveys of nearby loca-

tions in Kohala and Hāmākua have provided some comparative information (see Cordy 1994:43-57, Tuggle 1976). In 1971, Jean Martin from the Department of Land and Natural Resources (DLNR) Historic Sites Section visited Laupāhoehoe nui and noted "numerous house platforms," and "innumerable terraces for irrigated taro" as well as a stone paved and curbed trail running along the coast. The site complex was entered in the state inventory (#50-10-03-2109), but no systematic archaeological survey or any mapping of cultural features on the marine bench had been completed prior to 2001. Ross Cordy included Martin's information in his *Regional Synthesis of Hāmākua District, Hawai'i Island*, and provided some additional information on land ownership at Laupāhoehoe Nui associated with Mahele land claims in the 1840s and 1850s (Cordy 1994:44, 48, 57). Kepā Maly (1999) also completed a cursory historical records search. Cordy's report and Maly's report uncovered different sets of information on nineteenth century and early twentieth century land-use. A brief synthesis of the historical information is provided below, followed by a discussion of the more recent archaeological surveys.

FIRST SETTLEMENT

Due to their well-watered and level valley floors (optimally suited for the cultivation of taro), Waipi'o and Waimanu Valleys are both expected to have been among the first places settled by the Polynesian discoverers of the Hawaiian Islands (Cordy 2000:124). Following a model that has been frequently cited (see Kirch 1985), Cordy (2000:99-128) suggests that first settlement probably occurred around AD 300-600, if not slightly earlier. Other archaeologists argue that first settlement occurred after AD 600 (Spriggs and Anderson 1993). Despite continuing debates, substantial excavations of early sites and suites of radiocarbon dates have not been collected from Waipi'o, Waimanu or any other windward valleys on Hawai'i Island that are considered likely spots for early settlement.

The proximity of Laupāhoehoe nui to these valleys leads one to assume that some human use of the marine bench may date as early as the first settlements of the nearby valleys of Waipi'o and Waimanu. More intensive settlement of the bench may have occurred as social pressures or population increases motivated people to move out of the valleys to higher risk areas. This model, however, assumes that the marine bench was present in the middle of the first millennium AD. Because the marine bench was created from a series of massive landslides, it is possible that the bench did not even exist at the time that Waipi'o and Waimanu Valleys were settled, and geomorphological studies of the marine bench have yet to be conducted that could establish the parameters in which human settlement occurred.

Published information on the pre-contact cultural history of Laupāhoehoe nui is virtually non-existent, although oral histories may still provide some information on this era. Waipi'o Valley, however, is well documented as an important area in Hawaiian mythology, and as a ruling center for the entire island from AD 1400s to AD 1600s possibly beginning under the chief Kanipahu, followed by Kaha'imoele'a, Kūāiwa, Kihanuīlulumoku, Līloa and 'Umi (Cordy 1994:6; 2000:188-207). Some earlier accounts from the late AD 1200s and AD 1300s also

suggest that a luakini *heiau* had previously been built in Waipi'o (Cordy 1994:26). Laupāhoehoe nui eventually became an outlying *ahupua'a*, supporting Waipi'o and the adjacent Waimanu valley chiefly centers with the production of surplus foodstuffs. Cordy (1994:41) suggests that the pre-contact *ahupua'a* was probably a combination of an adjacent *ahupua'a* (Laupāhoehoe iki) and Laupāhoehoe nui, and that the division into separate *ahupua'a* may have occurred in the nineteenth century. The name "Laupāhoehoe," (lit. "leaf of lava"), is also applied to another *ahupua'a* in the North Hilo district, as William Ellis implied in the quotation cited above. In the case of North Hilo, a lava flow actually created a solid coastal bench, and the place name seems more *apropos* in the latter case. One may further infer that the name of Laupāhoehoe in Hāmākua was borrowed from the *ahupua'a* in North Hilo, due to the similar shape of the coastal terrace, thus explaining the misnomer in Hāmākua.

MID-NINETEENTH CENTURY HISTORICAL RECORDS

Census data collected in 1842 and 1845 suggest that approximately 80 people lived in Laupāhoehoe nui and Laupāhoehoe iki at that time (Lyons 1842 *Statisticks [sic] Book*, in Cordy 1994:41). Beginning in 1848 when the Monarchy decided to change land tenure from usufruct rights to fee-simple ownership, four claims were made by commoners on the marine bench at Laupāhoehoe nui (Figure 2; LCA 7132 to Kawau; LCA 240-N to Kanaka; LCA 7132-B to Kaowao; LCA 7990 to Pupuka). These claims are accompanied by brief descriptions and maps in the awards books, and also refer to seven other individuals living at Laupāhoehoe nui who did not make claims. Because claims were generally made by the head of a household, Cordy suggests that at least 11 households were still living at Laupāhoehoe Nui in 1848-1851 (Cordy 1994:51). Cordy provides the following summary of land use:

Farm plots in the area included irrigated taro patches (*lo'i*) and dryland plots ("kihapai", "kula") on the marine benches. The taro *lo'i* appear to have been fed by canals from the waterfall's pool or drainage. The crops in the dryland plots are not identified, except a statement that one plot had three breadfruit trees (NT 1848, 4:231). Ko'ele (tax) taro *lo'i* were also present. House lots were also on the marine bench. The only lot for which descriptions are available was for LCA 7132. This lot was enclosed and had six houses, two for the claimant and four for the konohiki (NT 1848, 4:231).

The nature of land subdivisions in this *ahupua'a* is not very clear. The marine bench seems to have contained 'ili which correspond to single land awards. For example, the 4.0 acre LCA 240-N was Hanapapa 'ili and the 6.4 acre LCA 7132-B was Waiohaoha [a specific kind of edible freshwater algae-on Maui] 'ili (NR 1848,8:279; NT 1848, 4:231). Whether these lands were entire 'ili or whether they extended inland or had separate inland pieces is unclear.

Politically, a chief Kalaeokeko'i, received the *ahupua'a* of Laupāhoehoe nui (2) as an award (LCA

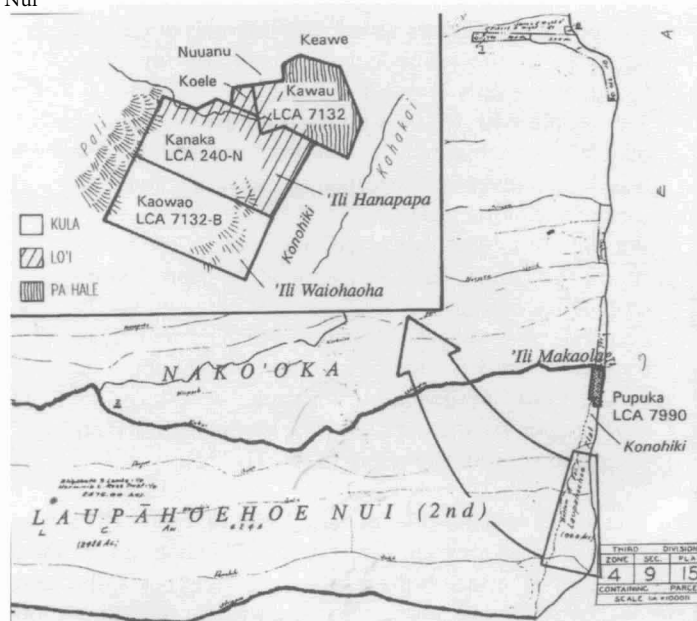


Figure 2. Map of Land Commission Awards (from Cordy 1994:42).

6245).

He was an absentee landlord. The *konohiki* of the *ahupua'a* was Kapokini, and he seems to have been a resident (NT 1848,4:231) (Cordy 1994:41-43).

Kepā Maly located additional information on mid-nineteenth century chiefly control of Laupāhoehoe nui (Maly 1999:6-8). Kalaeokeko'i was one chief who received land in Laupāhoehoe nui from the King. He was a low ranking chief who lived in Honolulu, and died on October 21, 1849. He was about 25 years old during the Mahele in 1848. He filed claim for several *ahupua'a* in Hāmākua, including Laupāhoehoe, Nāko'okā, 'Āpua, Kawaikapu, Honopu'e, and 'Āwini. The king granted him Laupāhoehoe on January 28, 1848 (Buke Mahele 1848:35-36), as LCA 6245, but not the other *ahupua'a* (although Kalaeokeko'i did own the 'ili of Kamakela in Honolulu as well). Grant 6245 also included fishing rights for Laupāhoehoe nui (Interior Department Book Volume 15, page 117, in Maly 1999:6).

Kalaeokeko'i was apparently the son of a chief named Kapokini (NT 3:329-330). Kapokini was best known as commander of two Hawaiian-owned ships (the *Becket* and *Kamehameha*) when they sailed under the overall leadership of the chief Boki on an ill-fated commercial venture to Rotuma and Vanuatu in December 1829. The *Becket* returned with a few survivors, but most of its crew had died. Boki and the entire crew of the *Kamehameha* were never heard from again (Kamakau 1992:294). It appears that Kapokini died in this venture as well, because Kamakau does not list him among the few survivors. Boki, and probably most of his hand-picked crew, had not been supportive of the missionary efforts in Hawai'i, and when news of the tragedy made it back to Hawai'i, Hiram Bingham (leader of the ABCFM Mission) wrote that it was like the "hand of God ... guarding the nation in a conspicuous and wonderful manner" (Bingham (1969[1849]:362). This aside is most relevant to an interpretation of Laupāhoehoe nui because it

places control of the district in the hands of a chief who was not necessarily fond of Christian doctrines, as Bingham's statement made clear. After the tragedy on the high seas, the King gave control of Laupāhoehoe nui to a chief named Ha'alilio (NT 3:329-330), but Ha'alilio "went abroad," and returned the lands to the King, who then gave them to Kalaeokeko'i during the Mahele. Interestingly, "Kapokini" was also the name of the resident *konohiki* at Laupāhoehoe nui under Kalaeokeko'i, and it seems likely that it was a relative with the namesake of Kalaeokeko'i's father.

After Kalaeokeko'i died in 1849, his half sister, Kalakini St. John, became his heir, and was granted the *kuleana* of Laupāhoehoe nui, though the rights of native tenants were reserved (LCA 6245 Part 2 10:399,406). In November of 1852, the Minister of the Interior received a complaint from the St. John family that the land of Laupāhoehoe was being sold to others as part of a grant program for those who did not receive lands during the Mahele. The bearer of the letter of complaint was identified as "Kapookini," also the *konohiki* for the St. Johns. Maly, however, found no grants that were pending or awarded at Laupāhoehoe nui in the 1850s (Maly 1999:10).

LATE NINETEENTH CENTURY RECORDS

Through the second half of the nineteenth century, ownership of Laupāhoehoe nui was passed through inheritance to various members of the St. John family, but there is no clear reference to any of the St. Johns establishing a residence there. Instead, the land was leased out to several individuals, including John Kekipi in the 1870s, presumably for the commercial cultivation of taro (cf. Bureau of Conveyances, Liber 29:402, 37:458, 1052:52; McKinzie 1983:54, in Maly 1999:11).

By the 1880s, the Hawaiian Government was heavily involved in building roads, and each district had its own road supervisor. In 1888, the Kohala Road Supervisor, H. P. Wood, forwarded a plan to connect Kohala with Hāmākua, generally following the coast, but skirting inland in the gulches from Awini to Waimanu. In one letter dated April 2, 1888, Wood wrote that the new road would be "disturbing the operations of 'ōkolehao (alcohol produced from distilled ti [*Cordyline fruticosa*] root) distillers perhaps but that could scarcely be mentioned as an objection." In another letter dated December 31, 1888 Wood suggested that he was halting work on the more difficult sections due to the excessive cost, but wrote that there were many reasons why he would like to continue the project, "for instance it would further the ends of justice in enabling the police to patrol what is now a secure fortress for Illicit Distilleries, Resort of Lepers, Runaway Plantation Hands etc. etc..." (Interior Department Files – Roads Hawaii, in Maly 1999:12).

A year later, a man named J. W. Kapololū wrote to Lorin A. Thurston (then serving as Minister of the Interior for the Monarchy), requesting that he be appointed as a government agent for portions of Hāmākua. Kapololū was a former resident of Laupāhoehoe nui, and was living in Waimanu at the time. He reported that 'awa (*Piper methysticum*) growing in Honopue nui and Honopue iki was being stolen by people in Kohala, and had also been discovered by the road workers. Kapololū hoped to stop the taking of the 'awa, and manage the continued construction of the coastal road (Interior Department

Letters and Files, in Maly 1999:13-14).

BOUNDARY COMMISSION TESTIMONY (TURN OF THE CENTURY)

Beginning in the 1870s, the Hawaiian government began certifying boundaries for *ahupua'a*. Metes and bounds surveys were often conducted, and a considerable body of testimony was collected from people knowledgeable about boundary locations. Testimonials for the boundaries of Laupāhoehoe nui were collected relatively late, following a metes and bounds survey conducted by T. K. Bipi in October 1899. Bipi was a professional surveyor, and he stated in testimony given in October of 1900 that he was accompanied on the survey by at least two *kama'āina* (people born and raised at the location) of Laupāhoehoe – the aforementioned J. W. Kapololū (then in his mid-sixties), and a man named Kaumelelau. Kaumelelau died in December of 1899, two months after the survey was completed. Others on the survey included Kapololū's son Kaheleho'okahi Kapololū (a 40 year-old resident of Waimanu), a man named Kahelelau Kumukahi (also a resident of Waimanu), another man named Kapela, and unspecified men from Waipi'o. A *kama'āina* of Laupāhoehoe named Kuamo'o was also mentioned, but he did not go on the survey because he was old and lived in Honolulu at the time (Boundary Commission Testimony 5:385, 390, 392, 393, in Maly 1999:15-17). No direct reference was made in the Boundary Commission testimony to anyone who still lived at Laupāhoehoe nui at that time, and most of the men on the survey team clearly were recruited from elsewhere, suggesting that few people were residing on the marine bench by the turn of the century.

THE EARLY 1900S

The first United States Geological Survey of the area was completed between 1911 and 1913. The 15-minute series map from the survey depicts one house on the marine bench (Figure 3). By the 1930s, however, this house appears to have been abandoned, and residents of Waipi'o and Waimanu stated that "there were a number of terraces [there] which are now unused" (Handy, Handy and Pukui 1972:536-537). Kepā Maly was also told the following information by Monty Richards, a resident of Kohala pertaining to a trip that Mr. Richards's uncle, Atherton Richards, had made in the 1930s:

Hiking from Pololū the elder Richards and his companions had to swim around several of the points to get to Laupāhoehoe Nui. Upon arriving there, they came upon an old abandoned house on the coastal flats. Being cold from the swim, the travelers entered the house and found an old trunk with some *mu'umu'u* (Hawaiian dresses) in it. To warm themselves they put them on, got dried out and warmed up, and then dried and returned the clothes to their



Figure 3. Detail of U. S. G. S. 15 minute series map dated 1911-1913, showing a single structure on the marine bench.

trunk. Richards and party then continued their journey towards Waimanu and Waipi'o.

In one of the valleys (Waimanu or Waipi'o), they spoke with someone about the old house, and inquired about its owner or former inhabitant. They learned that the last individual living in Laupāhoehoe nui had some time before contract[ed] Hansen's Disease and [had] been taken to Kalaupapa (personal communication to Kepā Maly by Monty Richards; February 24, 1999, in Maly 1999).

Further attempts to record oral histories for the 1900s should prove useful. Any number of activities may have occurred on the marine bench in the twentieth century, from renewed taro cultivation to 'ōkolehao production. Certainly the area has been a frequent recreational site for residents of Waipi'o, and more recently, for a wide range of recreational kayakers. Although isolated, it would be erroneous to consider the terrace an abandoned wilderness.

2001-2002 UH HILO ARCHAEOLOGICAL SURVEY

In May of 2001 and July of 2002, the author led volunteer teams from the University of Hawai'i at Hilo to begin a systematic survey of cultural sites on the marine bench. The survey was supported by a Watershed Resource Management Grant, and an additional seed grant from the Research Corporation of the University of Hawai'i (RCUH). Team members included Kalena Blakemore, Rick Gmirkin, Jeanne Knapp, Ellen Markin, Phoebe Mills, Auli'i Mitchell, and Chris Rathbun. Chris Rathbun served also as a primary informant, having spent a considerable amount of time on the marine bench since the 1970s.

Due to heavy forest cover over much of the terrace, and the steep cliffs that block from one-quarter to nearly one-half of the horizon, archaeological survey with Global Positioning Systems (GPS) was not optimal. Instead, the team opted to use a combination of initial pedestrian transect surveys followed by tape-and-compass mapping. GPS with a Garmin 12 XL was also used along clear coastal sections where satellite contact allowed for marginally accurate readings (EPE less than 10 m).

The field surveys each year were limited to eight days, in which time the teams attempted to map as many interior surface features as possible, knowing full well that a complete survey would not be achieved in such a short time. The survey team began at Paopao Falls near the western edge of the marine bench, and proceeded to the east, completing a survey of the shoreline, coastal vegetation line, and as many cultural features as could be located between the shore and the base of the cliff. A nearly complete survey of cultural features to the west of Waia'alala Stream was completed (Figure 4), and to the east of Waia'alala Falls, a representative range of features were mapped on the remainder of the marine bench. These included a major *lo'i* complex, near-shore habitation sites, a potential *heiau*, portions of dryland agricultural

complexes, the coastal trail, and portions of partially buried agricultural features on the edge of the 1822/1823 landslide recorded by William Ellis.

Tape-and-compass data were originally recorded in field notebooks with each reading receiving a unique reading number. A hand-drafted plan map was then created at a scale of 1:1000 from the tape-and-compass data. This map was then scanned and digitized to produce the reduced map included herein. Overall error/distortion is calculated to be approximately ± 6 meters over the length of the entire map. The calculation is derived from a comparison of relative error between survey teams in combination with GPS data; one survey team mapped the coastline, and met the other survey team that mapped the trail. At the termination of the trail on the eastern end of the bench, both teams mapped the same reference point, which was also recorded on GPS. After proceeding more than 1 mile on separate survey lines, the three plots for the same reference point were all within 6 meters of each other. Although this level of accuracy does not approach what is now possible with GPS in open areas, it should be recognized that maps with this level of accuracy still serve as important tools in areas with restricted satellite data.

The major feature complexes are described below from the west and proceeding east:

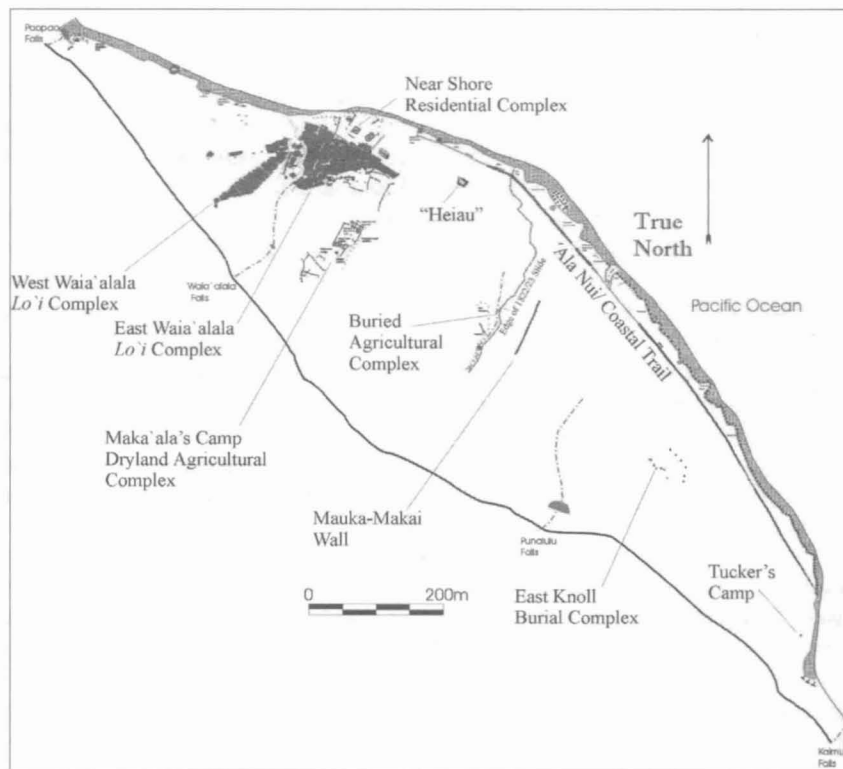


Figure 4. Archaeological Survey Map of Laupāhoehoe Nui, Hāmākua District.

West Waia'alala Lo'i Complex

Perhaps the most striking *lo'i* complex identified during the survey runs down a steep slope along the west side of Waia'alala Stream. This is located on the upslope edge of LCA 7132, described as a house lot containing 6 houses, and now mostly covered in beach boulders from storm surges and tsunamis.

Much of the complex is covered in a thick *hau* (*Hibiscus tiliaceus*) under-story. The upper portion of the complex begins on a single terrace constructed of large boulders, derived from the rock slides at the base of the cliff. Some of the boulders are estimated to weigh over 1000 pounds, and the intervening spaces in the walls are filled with smaller boulders. No clear water course is present that would supply this upper terrace from Waia'alala Stream, however the terraces are clearly constructed in a manner that would allow water to pass through small drainage channels from one field to another, suggesting that a water supply did formerly exist here. Either the stream has shifted course, or, as the Mahele records suggest, a system of ditches and/or bamboo troughs would have been necessary to irrigate the terrace system.

There are over 50 terraces arranged in 15 separate levels that proceed down the steep slope adjacent to the west bank of the stream. At the base of the complex, the *lo'i* terraces become larger, and fan out to cover much of the level portions of the marine bench above the storm surge zone, where many of the lower terraces have been covered or eroded by ocean waves.

Approximately 80 meters from the shoreline and 60 meters west of Waia'alala Stream, the marine bench begins to assume a steeper slope. At the foot of the slope to the west of the *lo'i* complex are two features where stones have been placed so as to form chambers that were capped with flat beach cobbles. In one case, the crypt is largely intact with an opening visible on the east end. In the second case, most of the capstones have been removed, and placed to one side of the crypt. From the similarity of these features to known burial crypts, it is likely that they once did, or still do, contain human burials.

East Waia'alala *Lo'i* Complex

A second *lo'i* complex occupies a large area directly to the east of Waia'alala Stream. Mahele documents suggest that the majority of this area was within the 4.0 acre 'ili of "Hanapapa," awarded to "Kanaka" (LCA 240-N). The current course of the stream has shifted to the west from an earlier course, and has eroded a 2-meter deep channel through several of the *lo'i*. Consequently, the team was able to observe and characterize the stratigraphic sections exposed in the truncated *lo'i* deposits. Stratigraphic sections demonstrate that the anthropogenic soils directly behind the *lo'i* walls range between 70 and 94 centimeters. Underlying substrates consist of colluvium with some alluvial reworking of the parent colluvium, but no obvious paleosols were observed in the more than 2-meter deep truncated stream channel. Furthermore, a basalt flake and a volcanic glass flake were collected from exposed sections of the anthropogenic pondfield soils on the surface, suggesting that these *lo'i* were being used before the common adoption of metal cutting tools in the 19th century. This provided us with the first tangible evidence of use of this *lo'i* complex before the mid-nineteenth century.

Pollen samples were also collected, but pollen recovery/preservation in the samples was generally poor, although high frequencies of charcoal in the pondfield deposits indicated former intensive burning on the terrace as a clearing and fertilization technique.

On the southern edge of the *lo'i* complex is a raised platform with a stone paving measuring roughly 6 x 9 meters that

may be a house platform. A depression in the stone paving on the eastern end of the platform was also identified as a possible *imu*, but no domestic midden was identified in the area.

Near Shore Residential Complex

From the Mahele documents, it appears that the area between LCA 240-N and the shoreline was considered *konohiki* land. The archaeological survey revealed few *lo'i* in this area, but there were several platforms that may have served residential or ritual purposes (Figure 4).

The edge of the marine bench in this location is being eroded, and portions of the complex have clearly been washed into the ocean; a trail segment, for example, is truncated by the current edge of the colluvial bluff, and a coconut palm grove is slowly falling over the bluff as well as the soil erodes away from the roots.

The largest platform is on the eastern end of the complex. It is two to three meters tall and approximately 6 x 9 meters wide. It is covered in heavy vegetation, and no attempt was made to delineate any internal structures during the initial survey. Directly to the west of this platform, a raised stone trail bends inland from the coastline, and separates the large platform from a smaller platform. The smaller platform has numerous stone alignments and internal features, and is slightly raised and leveled from the natural ground surface; it could have served as a small *heiau* or house platform.

Proceeding to the west along the coastline, there is another platform delineated by a low rectangular stone alignment, and on a small crest of the marine bench, there is another large house platform. This westernmost house platform in the complex was clearly occupied in the historical era due to the presence of sawn basalt rocks placed around the perimeter of the house foundation. It is in the approximate location of the house marked on the early 1900s U. S. G. S. map (Figure 3), and is most likely the house described by Atherton Richards that was abandoned by the 1930s.

The use of sawn basalt blocks is an unusual architectural form for rural Hawai'i, although dressed basalt blocks have been noted in other 19th century domestic agricultural complexes (Kirch and Sahlins 1992:71-72). Yet it is difficult to make sense of how the blocks would have been produced on the marine bench or why someone would have taken the time to transport them to the site. The blocks placed around the house foundation have generally been sawn only on the exposed surfaces. One explanation may be that these are left over pieces of a stone cutting process that were scavenged from another site and brought to Laupāhoehoe nui. For example, the Hilea Mill in Ka'u (see Hawaii Register of Historic Places, 50-10-68-7360) was constructed in 1881 using blocks of basalt that had been sawn into rectangular form, and prison labor was used to produce sawn basalt curbstones in downtown Hilo starting in the late 1800s.

Maka'ala's Camp Dryland Agricultural Complex:

Proceeding south from the "East Waia'alala *Lo'i* Complex," one ascends a moderate slope covered in thick Christmasberry (*Schinus terebinthifolius*) and *hala* (*Pandanus odoratissimus*). There is good soil development on the slope, interspersed with boulders that fell from the cliff above, and other

basalt flakes were recovered in this area. Former occupants of the bench arranged the boulders into loosely stacked terrace walls that appear to have supported dryland agriculture. After heading south for approximately 60 meters, the incline levels off, where there is a residential complex including at least two house platforms and a probable burial consisting of a low, rectangular stone-paved platform. Dryland terraces continue to occur through the residential area, and onto a gentle incline further south. One of the current property owners, Maka'ala, has established her camp on this knoll, and is beginning to cultivate some of the soil.

Proceeding further south, dryland terraces continue to the base of the *pali* where Waia'alala stream descends in a series of stepped waterfalls. Given the stepped nature of the *pali* in this location, it may have been one convenient route to reach the top of the *pali*, as Ellis observed residents of Hāmākua doing in 1823. This complex closely corresponds with the 'ili of Waiohaoha, awarded to Kaowao (L.C.A. 7132-B).

Dryland agricultural features continue to the north and east, but are covered in thick vegetation, and no attempt was made during the initial survey to map their extent. The continued survey of dryland features to the east of Maka'ala's camp is one of the largest remaining survey tasks.

"Heiau"

Directly to the east of the dryland agricultural complex and approximately 60 meters from shore is a stone enclosure. The walls are all rubble with no obvious facings, yet they are over one meter tall. The interior is covered in vegetation making surface observations difficult, but seems to be partially filled. Entry into the enclosure appears to have been near the northern corner, where the rubble wall forms a small triangular stone ramp. Chris Rathbun was informed by a long-term resident of Waipi'o that this was a *heiau* (Chris Rathbun, personal communication 2001).

Coastal Trail

Running for nearly a kilometer near the coastline on the eastern half of the marine bench is a trail, most of which is paved with interlocking stones with small curbs on each side. The trail is clearly designed for foot traffic, or at most, single-file horse traffic. It is well built, with depressions being filled to keep the trail on a level plane and straight course. The most important clue pertaining to the date of construction for the trail is the fact that it crosses over the top of the 1822/1823 landslide, suggesting that significant investments in this trail date after that time. It is possible, however, that a trail was in place before the landslide occurred, and portions of the trail to the west of the landslide are constructed in a different manner, with varying widths and water-worn stones.

Given the historical records from the 1880s suggesting that a trail was being built at that time, the trail on top of the 1822/1823 landslide may date to that era, although the location along the coast does not match the inland location proposed by H. P. Wood in 1888. Nevertheless, Kapololū's mention of road workers in 1889 constructing a road as far as Honopue may have involved this section of road (see Maly 1999:13-14).

Buried Agricultural Complex

Proceeding along the western edge of the 1822 landslide, a small un-named stream has eroded the edge of the landslide, exposing portions of a buried anthropogenic soil and a stone terrace projecting from under the slide. The anthropogenic soil is buried under approximately two meters of rock where the stream has re-exposed the paleosol. In 2001, a soil sample was collected from the paleosol that contained charcoal, a polished flake from an adze, and a small fragment of volcanic glass. In 2002, the face of the landslide was cleaned over a 3-meter section, and sediments were screened, revealing numerous examples of volcanic glass flakes and a few basalt flakes at the base of the landslide deposits.

An attempt was made to extract pollen from the paleosol and the results were better than in the alluvial sections that were sampled along Waia'alala Stream. There were two organic rich strata superimposed on each other that formed the paleosol. The lowest stratum (444-1) contains relatively high concentrations of charcoal. The stratum immediately on top of it contains slightly less charcoal, but a range of pollen species indicative of Hawaiian agroforestry. On the west side of the small stream on top of a knoll, there is also a dryland terrace wall with a *papamū* stone, used for playing the Hawaiian board game, *kōnane*.

Mauka-Makai Wall

On top of the 1822/1823 landslide is a low wall, built in a straight line ascending the talus slope of the landslide. Mahele documents identified numerous families living at Laupāhoehoe in the 1840s, other than those which claimed LCS to the west, and this may be a boundary wall associated with other 'ili.

East Knoll Burial Complex

Proceeding further east, one ascends a knoll covered in a 'ōhi'a (*Metrosideros polymorpha*) over-story. The knoll drops off sharply on the east, creating a promontory looking over the ocean, and several low rectangular stone mounds are present here, indicative of burials. The survey team mapped four of the mounds in a cursory survey, but the thick 'ōhi'a cover is most likely obscuring other burials.

Tucker's Camp

At the extreme eastern end of the marine bench near Kaimu falls, the beach is generally protected from the prevailing shore break, and is a popular location for coming ashore in kayaks. A recent campsite has been established here, and a coconut and *lauhala* thatched house has been built by a reclusive hermit generally known as "Tucker" or "Kin." The same individual also built a small kiln out of beach cobbles and succeeded in firing local clays to produce thick red earthenware ceramics, of which waster pieces lie on the ground around the kiln. In future years, it is hoped that no one mistakes these for Polynesian plainware.

DISCUSSION

Laupāhoehoe nui presents a valuable opportunity to study changing patterns in Hawaiian settlement patterns associated with high-risk environments, possibly dating as early as the mid-first millennium AD and proceeding through the historical era. From the brief site descriptions provided above, it should

be apparent that establishing a diachronic model of settlement and subsistence on the terrace cannot rely on the extant description and interpretation of surface features. Like Anahulu Valley on O'ahu (Kirch and Sahlins 1992), many of the observed features – despite their traditional Hawaiian forms – may date to the historical period. The identification of basalt flakes and volcanic glass does little other than re-confirm that the terrace was occupied by the early 19th century, and processing suites of radiocarbon dates from short-lived organic material derived from buried paleosols and *lo'i* deposits will be necessary to develop an understanding of earlier settlement. Further geomorphological work combined with radiocarbon dating of various archaeological deposits could help establish when the marine bench was first settled, and address questions pertaining to why people chose to live there (e.g. population pressure vs. social factors), and how they chose to structure their cultural landscape. If dates for settlement are found to be later than 1778, then population pressure is probably not an issue, but would reflect social factors (isolation from warfare, avoidance of increasing demands of chiefly tribute, avoidance of missionaries, avoidance of plagues, etc...).

Laupāhoehoe nui could also provide an excellent case study pertaining to changing economic patterns in Hawaiian prehistory and history. Archaeological analyses of the kinds of materials found on the terrace could indicate the degree to which materials were exchanged off the terrace, and to what degree the community was self-sustaining. By studying flakes from adze use and volcanic glass artifacts, we intend to identify materials that were traded in from other sources versus those that were derived from local sources in the Kohala volcanic series. As previously mentioned, this issue would also relate to the construction of the historical house foundation with the sawn basalt foundation.

Archaeological and historical information also point to the establishment of separate *'ili* by the 1840s that appear to be associated with different environmental zones (dryland agricultural fields versus *lo'i*). Documenting *'ili* boundaries may help us understand how different sorts of resources may have been exchanged within the *ahupua'a* between the households living in various *'ili*. The extent to which upland resources above the *pali* were exploited could also be addressed through palaeoethnobotanical studies (pollen, phytoliths, and wood charcoal).

One of the most significant contributions that could be made by further investigations of the marine bench pertains to the archaeological deposits that were suddenly covered by the 1822/1823 landslide. Because these deposits are so well dated, and contamination of the deposits from more recent eras is unlikely, they could answer questions regarding patterns in early historical rural Hawaiian agriculture that could be addressed in few other places. For example, we do not currently know the extent to which Western cultigens (such as melons, cabbage, grapes, citrus etc...) were adopted in this early period of the nineteenth century in rural Hawai'i. Understanding the extent to which commoners chose to incorporate such new cultigens in their agricultural systems would offer new insight into the cultural changes occurring in Hawaiian communities that were not directly affected by Western settlers, and the sort of cultural dynamics occurring in the main port towns.

Documents from the late 1880s list a number of activities

that were occurring in these remote shoreline communities of Hāmākua including *'awa* cultivation, *'ōkolehao* production, and the formation of isolated communities of people suffering from Hansen's disease. Due to the negative social image associated with all of these factors propagated by the Christian moralities that dominated life in Hawai'i at the turn of the century, these sorts of communities are not well understood. The historical house platform associated through oral tradition with a man that eventually was sent to Kalaupapa with Hansen's disease, may provide an opportunity for investigating how life in Hāmākua may have been affected by the introduction of this pernicious disease, and how cultural practices that were frowned upon by the missionary morality may have thrived in rural communities.

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